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SNOW SURVEYS AND IRRIGATION WATER FORECASTS
FOR MISSOURI AND ARKANSAS RIVERS
April 1, 1939

The following data pertaining to snow surveys and irrigation water-supply forecasts are provided by Bureau of Agricultural Engineering of the U. S. Department of Agriculture, in cooperation with State departments, other Federal bureaus and local organizations. The snow measurements are made principally by field personnel of the following organizations: Forest Service, National Park Service, Bureau of Reclamation, U. S. Geological Survey, War Department and State Experiment Stations. This work is otherwise conducted cooperatively with the State Engineers of Wyoming and Colorado, and various municipalities, irrigation associations, power companies and others. Precipitation records are supplied by the U. S. Weather Bureau.

P R E C I P I T A T I O N D A T A

WATERSHED	STATE	Precipitation October 1 to March 31	Departure from Normal		Precipitation March	Departure from Normal	
			Inches	Inches		Inches	Inches
Missouri	East. Mont.	3.26	-0.52	0.35	-0.46		
Missouri	Cent. Mont.	4.74	+0.11	0.57	-0.30		
Missouri	North. Wyo.	8.11	+1.06	1.03	-0.56		
North Platte	Wyoming	5.09	-0.65	0.78	-0.32		
South Platte	Colorado	5.32	+0.05	1.36	-0.23		
Arkansas	Colorado	4.96	+0.67	0.94	-0.05		

Colorado

Reservoir storage on the South Platte in the Denver area is $2\frac{1}{2}$ times as great as last year at this time. On the South Platte between Kersey and Julesburg, the water in reservoirs is more than $1\frac{1}{2}$ times greater than last year. On the tributaries of the South Platte in northern Colorado, the reservoirs have more than $2\frac{1}{2}$ times as much water in storage as they did last year. There is four times as much water in storage in the Arkansas and tributary valleys as there was April 1, 1938.

On the South Platte and its tributaries in Colorado and on the North Platte in North Park, there is ample moisture in the soil. Moisture conditions are good also in the Arkansas Valley.

The water content of the snow in the mountains in Colorado is slightly less than it was a year ago. On the Arkansas River drainage, the water content is 10 percent less than last year, as shown by nine courses, and on the South Platte drainage it is 5 percent less, as shown by 13 courses. Seven courses on the Poudre

indicate that the water content of the snow is 13 percent less. Although there is a deficiency in the water content of the snow in the mountain areas, there is much more water in storage in reservoirs and soil than there was last year, and consequently no shortage of water for irrigation is expected at this time even though the runoff will be less this year. If, however, snowfall in the mountains during April is below normal, the prospects for the irrigation water supply for the late season will not be so favorable, particularly for canals without storage rights.

Wyoming

Reservoir storage on the North Platte and its tributaries in Wyoming is nearly twice as great as it was last year at this time. Storage in Jackson Lake on the Snake River is nearly 50 percent greater and in the Shoshone Reservoir, on the Yellowstone River drainage, the storage is about 25 percent more.

Soil moisture conditions in the Laramie River and Snake River basins are good. Portions of the North Platte Valley have abundant soil moisture, but there is a deficiency north of Saratoga. In the plains area conditions are not good except in the southeastern part of the State. Soil moisture is deficient also in the northwestern part of Wyoming.

The water content of the snow on the watershed of the North Platte in Wyoming, as shown by 10 snow courses, is on the average 10 percent less this year. Eight courses on the Laramie River indicate that the water content of the snow is 15 percent less than a year ago and the water content of the snow on the Yellowstone River and its tributaries in Wyoming is also less. Because of only a small deficiency in water content of the snow, above-normal storage of water in reservoirs and generally good soil moisture conditions, the outlook at this time for ample water for irrigation is favorable.

Montana

Below normal precipitation on the watershed of the Missouri and tributaries in Montana has resulted in a deficiency in soil moisture. Early melting of snow in the mountain areas has caused floods on some of the tributaries of the Missouri and has reduced the snow cover available for late runoff. The depth and the water content of the snow in the mountain areas is definitely less than it was last year and unless conditions improve materially during April, the summer runoff will be considerably less this year.

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CONCLUSION

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MISSOURI AND ARKANSAS

Summary of Federal and State Cooperative Snow Surveys

Bureau of Agricultural Engineering, U. S. Dept. Agr.; Forest Service; Colo. Agri. Expt. Station
 Issued April 10, 1939. Colo. Expt. Station, Fort Collins, Colo.

Main Drainage and No. Snow Course	Local Drainage	State	Location Locality	Descrip- tion	Elev.	National Forest	Apr. 1 Snow Course Measurements					
							Snow Depth		Av. Water Content			
							Av.	In.	Av.	In.		
JEFFERSON RIVER												
6	Camp Creek*	Idaho	6mi. N. Spencer	21-13N-36E	6800	Targhee	33.6	51.7	16.8	9.6	16.7	4.8
7	East Fork R. S.*	Mont.	15mi. NE. Sula	16-2N-17W	5400	Bitterroot	--	--	10.8	--	--	3.3
9	Elkhorn Hot Spgs.	Mont.	8mi. N. Polaris	15-4S-12W	8450	Beaver Head	--	--	27.0	--	--	8.0
7	Gibbons Pass	"	Gibbons Pass	4-2S-19W	7100	Bitterroot	--	--	55.4	--	--	20.5
26	Moose Creek*	Idaho	3mi. S. Gibbons P.	22-27N-21E	6200	Salmon	41.8	45.4	39.1	13.8	14.1	14.9
31	Pipestone Pass	Mont.	Pipestone Pass	11-1N-7W	7200	Deer Lodge	--	--	21.4	--	--	6.1
	Storm Lake*	"	15mi. W. Anaconda	19-4N-13W	8135	" "	--	--	27.0	--	--	7.0
			Average for Drainage				37.7	48.5	28.2	11.7	15.4	9.2
MADISON RIVER												
2	Aster Creek*	Wyo.	Lewis L.	44-3N110-6W	7700	Vel. Nat. P.	78.4	80.0	81.4	30.3	29.5	28.0
3	Big Springs*	Idaho	Big Springs	34-14N-44E	6500	Targhee	60.2	72.0	49.9	20.4	23.3	17.8
	Hebgen Dam	Mont.	Hebgen Dam	22-11S-3E	6550	Gallatin	43.1	52.5	29.6	14.6	17.8	10.6
8	Lewis L. Divide*	Wyo.	3mi. S. Lewis L.	44-2N110-7W	7900	Vel. Nat. P.	108.7	104.0	123.0	43.3	40.5	44.2
11	Norris Basin	"	Norris Basin	44-7N110-7W	7500	" "	--	--	26.0	--	--	8.7
	Twenty-One Mile*	Mont.	8mi. S. Gallatin	1-11S-5E	7150	" "	51.8	64.5	39.3	17.4	22.2	13.8
14	Valley View*	Idaho	5mi. E. Henrys L.	7-15N-44E	6500	Targhee	49.7	62.0	39.9	15.3	20.0	12.2
15	West Yellowstone	Mont.	W. Yellowstone	34-13S-5E	6700	Gallatin	36.6	45.3	24.7	12.2	14.9	8.6
			Average for Drainage				61.2	68.6	51.7	21.9	24.0	18.0
GALLATIN RIVER												
	Devil's Slide	Mont.	20mi. S. Bozeman	14-5S-6E	8100	Gallatin	--	--	63.9	--	--	19.9
	Hood Meadow	"	14mi. S. Bozeman	22-4S-6E	6600	" "	--	--	26.4	--	--	7.9
	Hood Meadow Extn	"	14mi. S. Bozeman	22-4S-6E	6600	" "	--	--	25.5	--	--	7.5
	Mystic Lake No. 1	"	12mi. SE. Bozeman	31-3S-7E	6600	" "	23.6	27.0	14.5	6.5	8.7	4.1
	Mystic Lake No. 2	"	12mi. SE. Bozeman	31-3S-7E	6600	" "	23.9	21.6	19.5	5.9	4.9	5.9
	Twenty-One Mile	"	8mi. S. Gallatin	1-11S-5E	7150	Vel. Nat. P.	51.8	64.5	39.3	17.4	22.2	13.8
			Average for Drainage				33.1	37.7	31.5	9.9	11.9	9.8

MISSOURI AND ARKANSAS

Summary of Federal and State Cooperative Snow Surveys

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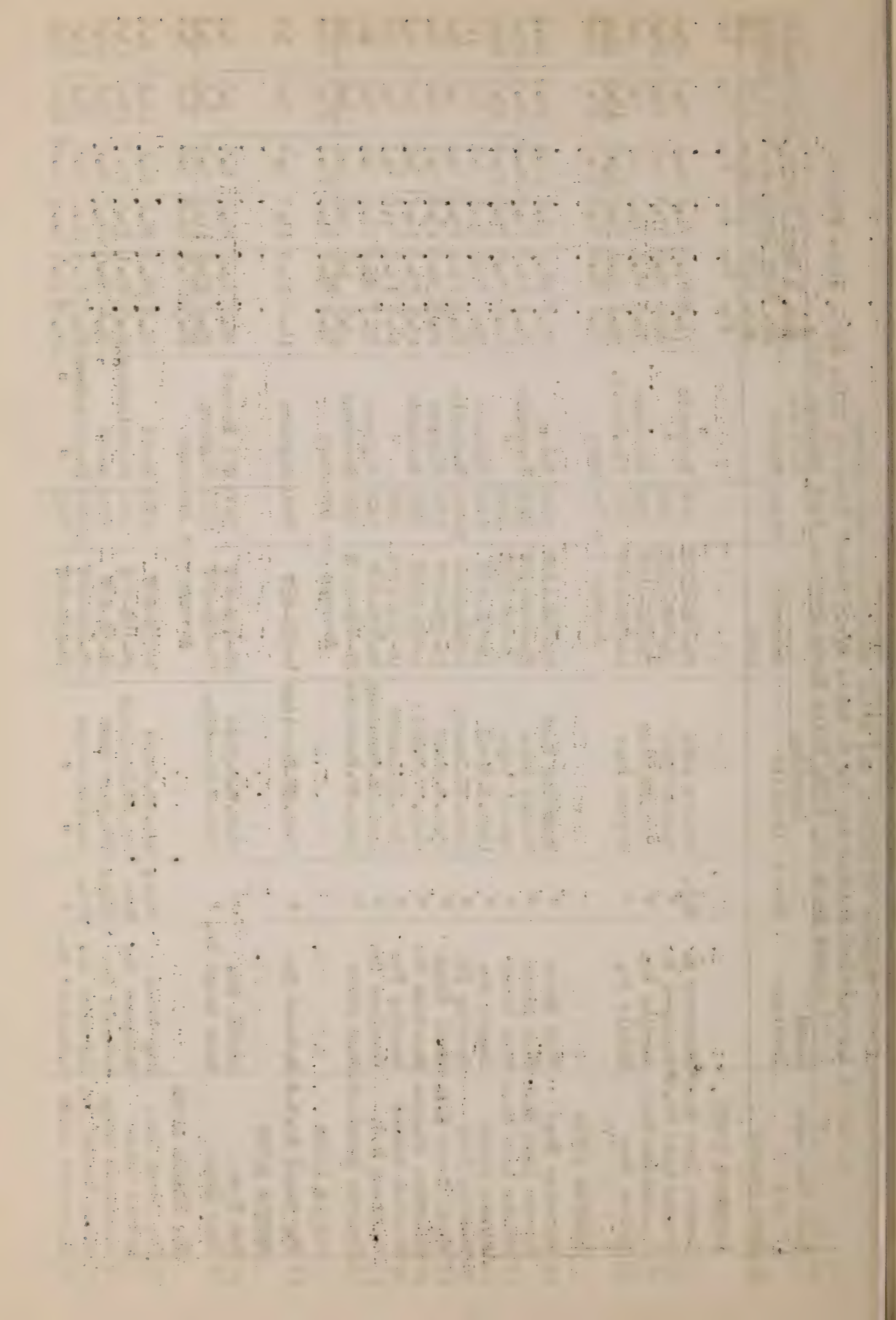
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No.	Main Drainage and Snow Course	Local Drainage	State	Location		Description	Elev.	National Forest	Apr. 1 Snow Course Measurements				
				Locality					Av. Snow Depth	Av. Water Content	1938	1939	
MISSOURI RIVER													
5	Chessman Res.	Tenmile	Mont.	11mi. SW. Helena	2-8N-5W	6200	Helena		19.6	22.4	10.3	5.3	3.2
35	Tenmile Cr. Lower	"	"	17mi. SW. Helena	13-8N-6W	6250	"		23.3	23.4	16.6	5.9	4.7
36	Tenmile Cr. Middle	"	"	"	13-8N-6W	6800	"		37.8	35.7	33.2	10.0	10.4
37	Tenmile Cr. Upper	"	"	"	19-8N-5W	8000	"		43.1	42.6	38.8	12.5	12.7
30	Stemple Pass	Canyon Cr.	"	Stemple Pass	16-13N-7W	6900	"		---	---	27.1	---	7.8
10	King's Hill	Belt Cr.	"	21mi. NW. Sul. Sprgs	35-13N-7E	7950	Lewis & Clark		---	---	40.8	---	11.5
	Orville Harris	Mussellshell R	"	12mi. E. W. Sul. Sprgs	31-10N-9E	6500	"		19.8	24.0	15.5	4.8	3.7
	Goat Mountain	South Fork	"	26mi. W. Gilman	47-5N 12.9W	7000	"		---	---	27.4	---	9.1
	Grasshopper	Grasshopper Cr.	"	6mi. SW. W. Sul. Sprgs	19-9N-8E	7000	"		18.1	22.6	13.7	4.6	3.3
Average for drainage									27.0	28.4	24.8	7.2	7.4
MARIAS RIVER													
18	Marias Pass	Two Medicine	"	Summit	48.3N 13.4W	5250	Glacier NP		46.8	50.9	42.2	18.6	20.4
YELLOWSTONE RIVER													
Blacktail Deer Cr. Canyon	Blk. Tail Deer Tower Cr.	Wyo.	"	11mi. SE. Gardiner	44.9N 110.6W	7500	Yel. Nat. P.		38.5	43.8	33.3	11.1	9.4
				8mi. N. Canyon Jct	44.7N 110.5W	7750	"		---	---	33.0	---	7.0
Camp Senia	W. Fk. Rock Cr.	Mont.	"	10mi. W. Red Lodge	2-8S-18E	7870	Custer		25.0	23.0	27.0	4.7	5.6
Cooke City	Soda Butte Cr.	"	"	Cooke City	25-9S-14E	7400	Absaroka		28.3	32.0	23.0	7.4	6.6
Crevice Mt. No. 1	Yellowstone R.	"	"	6mi. E. Gardiner	26-9S-9E	8400	Yel. Nat. P.		36.6	43.0	31.8	10.2	9.7
Crevice Mt. No. 2	Yellowstone R.	"	"	7mi. E. Gardiner	25-9S-9E	8200	"		36.6	44.0	32.0	10.0	9.2
Beaver Dams	Blk. Tail Deer	Wyo.	"	11mi. SE. Gardiner	44.9N 110.6W	7200	"		24.7	29.8	19.6	7.4	5.8
Lupine Creek	Lupine Cr.	"	"	11mi. SE. Gardiner	44.9N 110.6W	7300	"		33.2	37.3	29.1	9.1	7.9
Porcupine	Porcupine Cr.	Mont	"	12mi. NE. Wilsall	10-4N-10E	6500	Absaroka		---	25.0	---	---	---
Lodgepole	Lodgepole Cr.	Wyo.	"	34mi. NW. Cody	32-56N-106W	8200	Shoshone		33.4	34.2	32.7	10.6	9.4
Average for drainage									32.0	34.7	29.1	8.8	7.8

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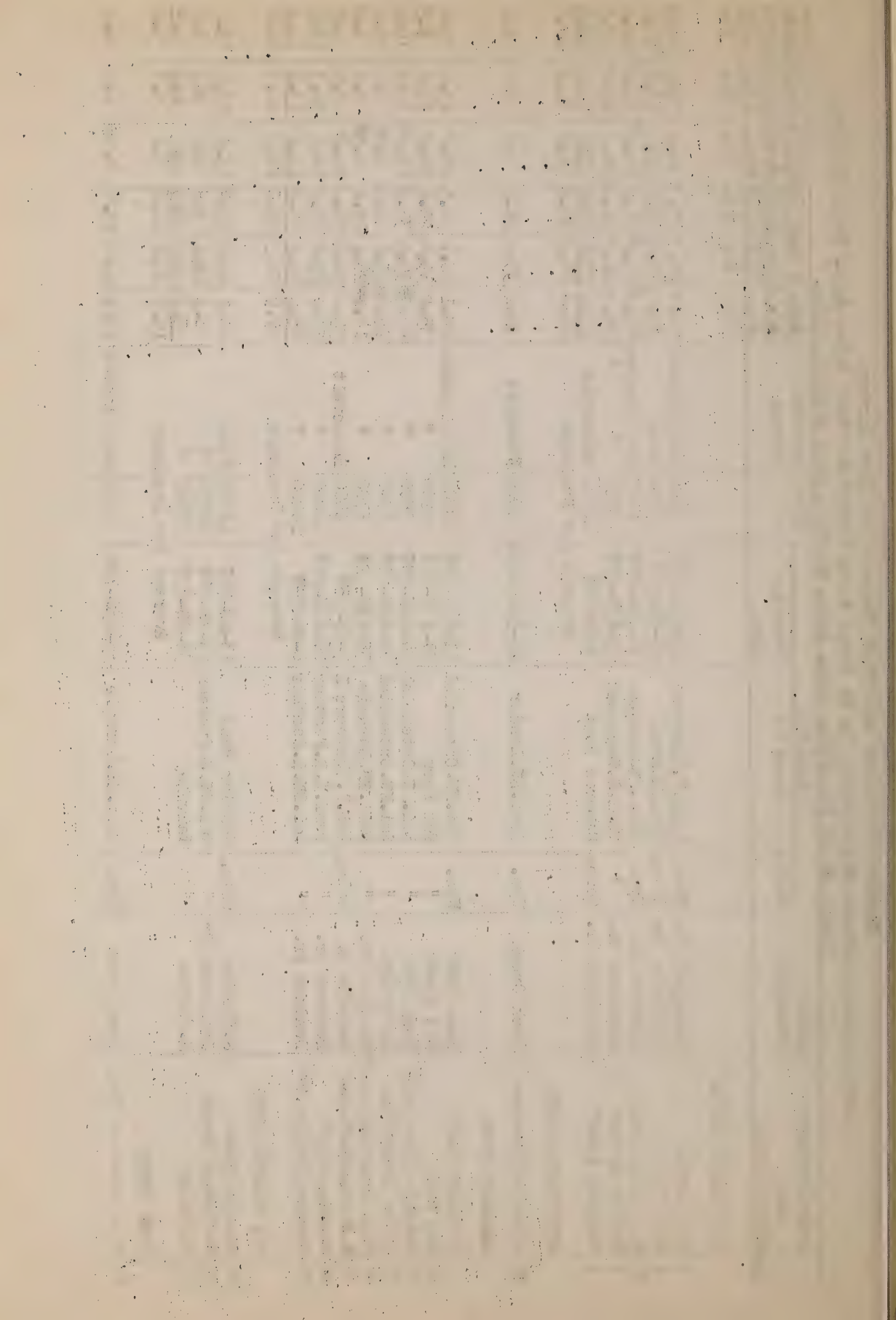
Main Drainage and Snow Course		Local Drainage	State	Locality	Description	Elev.	National Forest	Apr. 1 Snow Course Measurements					
No.	Snow Course							Av. Snow Depth	Av. Water Content	1938	1939	1938	1939
								In.	In.	In.	In.	In.	In.
SHOSHONE RIVER													
	Brooks Lake No. 1	Shoshone R.	Wyo.	Brooks Lake	25-44N-110W	9000	Washakie	77.8	87.3	71.8	26.6	28.9	25.6
19	Brooks Lake No. 2	Shoshone R.	"	Brooks Lake	23-44N-110W	9200	"	62.0	70.9	57.4	18.2	22.5	18.6
33	Up. Hardpan Basin	Hardpan Cr.	"	27 mi. SW. Cody	25-51N-106W	9500	Shoshone	39.8	44.1	39.5	8.7	8.6	9.6
32	Sylvan Pass	Middle Cr.	"	Sylvan Pass	12-52N-110W	7100	Yel. Nat. P.	48.7	57.1	40.4	13.4	14.9	11.9
					Average for Drainage			57.1	64.8	52.3	16.7	18.7	16.4
BIGHORN RIVER													
12	Togwotee Pass	Wind River	"	Togwotee Pass	29-44N-110W	9600	Teton	79.8	88.7	72.6	27.9	30.9	26.8
	Brooks Lake No. 1	Wind River	"	Brooks Lake	25-44N-110W	9000	Washakie	77.8	87.3	71.8	26.6	28.9	25.6
19	Brooks Lake No. 2	Wind River	"	Brooks Lake	23-44N-110W	9200	"	62.0	70.9	57.4	18.2	22.5	18.6
16	Ranger Creek	Ranger Cr.	"	14 mi. E. Shell	32-53N-88W	8800	Bighorn	39.2	47.9	31.5	8.1	9.7	7.9
22	Roaring Fork	Roaring Fk.	"	16 mi. SW. Lander	7-31N-101W	10200	Washakie	25.5	27.2	14.5	6.9	7.2	4.2
15	Shell Creek R. S.	Shell Creek	"	13 mi. E. Shell	19-53N-88W	7700	Bighorn	24.3	32.5	15.8	5.7	8.1	4.4
20	Sheridan Cr. R. S.	Sheridan Cr.	"	16 mi. NW. DuBois	3-42N-109W	7500	Washakie	23.9	23.3	16.7	5.5	5.5	4.3
21	Whorten Meadow	Roaring Fk.	"	16 mi. SW. Lander	18-31N-101W	9200	"	14.4	17.3	8.6	4.3	4.0	2.4
13	Tensleep R. S.	Tensleep Cr.	"	15 mi. NE. Tensleep	30-49N-86W	8300	Bighorn	32.3	39.2	27.0	7.0	8.9	5.9
18	Dunrude Dude Ranch.	Wood River	"	11 mi. SW. Sunshine	21-46N-103W	8000	Shoshone	2.9	3.6	0.0	1.0	1.8	0.0
					Average for Drainage			38.2	43.8	31.6	11.1	12.7	10.0
TONGUE RIVER													
17	Big Goose Cr. R. S.	E. Goose Cr.	"	20 mi. SW. Sheridan	4-53N-86W	7700	Bighorn	14.6	11.9	11.3	3.4	3.6	3.1
POWDER RIVER													
30	Red Fork	Middle Fk.	"	23 mi. W. Kaycee	18-43N-85W	7500	Off Forest	28.9	32.1	27.6	6.6	7.6	6.9
31	Sour Dough	Sour Dough Cr.	"	10 mi. W. Klondike	17-49N-84W	8500	Bighorn	20.2	23.0	17.5	4.4	4.5	4.3
					Average for Drainage			24.5	27.5	22.5	5.5	6.0	5.6
NO. PLATTE RIVER													
51	Big Creek Lake	Big Creek	Colo.	5 mi. SW. Pearl	9-11N-82W	9000	Routt	41.8	44.3	34.0	10.6	11.8	8.6
7	Bottle Creek	Encampment Cr.	Wyo.	7 mi. SW. Encampment	24-14N-85W	8200	Medicine Bow	51.9	49.1	39.0	17.7	15.7	13.0
8	Columbine Lodge	Grizzly Cr.	Colo.	Rbt. Ears Pass	21-5N-82W	9300	Routt	69.4	69.0	60.7	24.0	23.1	22.2
37	North French Cr.	N. French Cr.	Wyo.	Cent/Saratoga	27-16N-80W	10200	Medicine Bow	85.5	89.9	81.1	34.5	35.1	33.9
38	N. Barrett Cr. #2	N. Barrett Cr.	"	"	30-16N-80W	9400	"	65.3	73.4	62.5	22.6	26.2	23.7



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							Av. Snow Depth	Av. Water Content	1938		1939	
							In.	In.	In.	In.	In.	In.
NO. PLATTE RIVER												
9 Old Battle	Encampmt Cr.	Wyo.	12mi.W. Encampmt	29-14N-85W	9800	Medicine Bow	92.8	88.7	77.2	34.0	31.9	29.8
7 Park View	Illinois Cr.	Colo.	7mi. SE. Rand	24-5N-78W	9200	Route	39.1	43.9	38.1	12.6	13.3	14.0
39 Ryan Park No. 2	Barrett Cr.	Wyo.	Cent./Saratoga	34-16N-81W	8400	Medicine Bow	42.9	48.7	31.9	12.1	14.6	10.2
8 Webber Spring	Encampmt Cr.	"	10mi.W. Encampmt	27-14N-85W	9000	"	65.7	64.0	51.2	22.8	20.8	17.5
1 Cameron Pass*	Michigan Cr.	Colo.	Cameron Pass	2-6N-76W	10300	Roosevelt	69.8	73.9	64.7	23.4	26.7	23.0
				Average for Drainage			62.4	64.5	54.0	21.4	21.9	19.6
SWEETWATER RIVER												
29 Grannier Meadows	Rock Creek	Wyo.	20mi. SW. Lander	19-30N-100W	9000	Washakie	38.1	39.2	28.1	9.8	9.9	8.0
LARAMIE RIVER												
3 Brooklyn Lake	Nash Fork	Wyo.	7mi. NW. Centennial	11-16N-79W	10200	Medicine Bow	68.1	68.1	50.5	23.2	23.6	18.6
11 Fox Park	Fox Creek	"	Fox Park	21-13N-78W	9200	"	35.2	39.4	25.1	10.2	11.8	7.3
36 Hairpin Turn No. 2	Nash Fork	"	5mi. NW. Centennial	24-16N-79W	9500	"	40.7	39.2	33.2	11.8	10.5	10.2
35 Libby Lodge No. 2	Libby Cr.	"	3mi. NW. Centennial	29-16N-78W	8700	"	29.6	23.6	28.3	8.4	6.4	8.7
34 Pole Mountain No. 2*	Soldier Cr.	"	10mi. SE. Laramie	35-15N-72W	8700	"	14.4	26.6	15.4	4.5	8.2	4.2
4 W. Fort. G. P. Tunnel	Laramie R.	Colo.	5mi. N. Chambers I	7-8N-75W	8600	Roosevelt	35.6	34.4	31.0	10.2	9.9	9.5
50 Deadman Hill*	Deadman Cr.	"	10mi. W. R. Feather	26-10N-75W	10200	"	50.7	53.8	52.2	14.5	16.3	15.5
71 Deadman Hill No. 2*	Deadman Cr.	"	8mi. SW. R. Feather	6-9N-74W	10200	"	45.0	46.6	43.3	12.7	13.1	12.2
				Average for Drainage			39.9	41.5	35.0	11.9	12.5	10.8
SO. PLATTE RIVER												
14 Hoosier Pass	S. Platte	Colo.	Hoosier Pass	13-8S-78W	11400	Pike	48.1	48.2	55.4	13.5	13.1	13.6
57 Jefferson Creek	Jefferson Cr	"	4mi. NW. Jefferson	23-7S-76W	10050	"	8.3	11.1	7.4	1.5	2.7	1.0
15 Fairplay	S. Platte	"	Fairplay	33-9S-77W	10000	"	3.2	7.9	4.9	0.4	1.2	0.4
				Average for Drainage			19.9	22.4	22.6	5.1	5.7	5.0
CROW CREEK												
34 Pole Mountain No. 2	Crow Creek	Wyo.	10mi. SE. Laramie	35-15N-72W	8700	Medicine Bow	14.4	26.6	15.4	4.5	8.2	4.2



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			Locality					Av. Snow Depth	Av. Water Content	1938	1939	In.
ARKANSAS RIVER												
73 Blue Lakes	Cuchara Cr.	Colo.	15mi. SW. LaVeta	30-31S-69W	10000	San Isabel	18.6	23.9	13.4	3.8	4.4	3.3
74 LaVeta Pass #2*	Cuchara Cr.	"	LaVeta Pass	22-28S-70W	9300	SanCristo Gr.	25.0#	37.5	22.6	7.2#	10.2	7.2
42 Marshall Creek*	Poncha Cr.	"	Marshall Pass	24-48N-6E	10800	Cochetopa	48.7	50.8	49.8	14.5	13.8	13.4
43 Poncha Creek	Poncha Cr.	"	Marshall Pass	19-48N-7E	10500	"	36.3	40.4	40.3	11.1	11.6	12.1
19 Tennessee Pass	Tennessee Cr.	"	Tennessee Pass	21-8S-80W	10200	"	41.1	45.4	44.7	9.8	10.7	9.0
21 Twin Lakes Tun.	Lake Cr.	"	9mi. W. Twin Lakes	22-11S-82W	10500	"	43.0	43.8	44.0	10.4	11.7	10.2
48 Whiskey Creek	Whiskey Cr.	"	Whiskey Cr. Pass			Maxwell Grant	31.1	41.1	18.3	8.1	8.7	6.1
78 Four Mile Park	Lake Cr.	"	3mi. SW. Twin Lakes	23-11S-81W	9700	Cochetopa	9.4#	13.6#	10.1	2.3#	2.5#	2.9
No. 2	E. Fork Ark. R.	"	Fremont Pass	2-8S-79W	11400	Arapaho	53.5	62.1#	66.8	18.1	17.9#	19.6
79 Fremont Pass #2			Average for drainage				34.0	39.8	34.4	9.5	10.2	9.3

*On adjacent drainage

#Readings on original course

φMeasurements taken on March 16.

(2010-39)

